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The state of G2G development: Maturity levels and current challenges

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ABSTRACT

e-Government has been promoted as a technology enabled public sector reform aiming at providing a more efficient, customer centric mode of governance. Still, recent research indicates that e-Government has not produced the expected results. Despite the slower-than-expected progress, the e-Government literature provides no clear indication of why progress is lagging. Recent findings suggest that the internal perspectives of e-Government (the G2G perspective) can be seen as a prerequisite for achieving the overall goals of e-Government. This paper reviews the G2G literature to investigate where, in Layne and Lee's (2001) maturity model, research is currently focused. Also, the paper identifies key research challenges for the G2G segment of e-Government. The results suggest shortcomings of the maturity model of Layne and Lee and show that the majority of research efforts currently focus on the higher maturity levels of e-Government development. The paper also shows that the organizational and managerial challenges discussed in the G2G literature currently outnumber the technological challenges and suggests a research agenda based on current shortcomings in both areas.

Keywords

e-Government, G2G, Maturity models, Literature review

INTRODUCTION

For several years, governments throughout the world have been seeking to provide electronic access to government services. Key reasons for this public sector reform have been to increase the efficiency of government operations, strengthen democracy, enhance transparency, and provide better and more versatile services to citizens and businesses (Coe Paquet and Roy 2001; Ho 2002; Watson and Mundy 2001). At the same time, a growing number of studies indicate that many of these hopes have not been realized, at least not to the extent expected and that e-Government is currently fairly immature (Flak Olsen and Wolcott 2005; Hoegler and Schuster 2002; Kaylor Deshazo and Van Eck 2001; Reddick 2004). These studies concluded that e-government has not revolutionized the way government functions and that governments have not realized the anticipated benefits of cost-savings, improved service delivery, and so forth. Although providing interesting insights about the relative positioning of governments, these provide only limited information on the actual maturity of e-Government.

e-Government can be thought of in terms of three distinct but inter-related spheres: the administrative sphere, the civil society sphere and the formal politics sphere (Gronlund 2005). Although e-Government is being studied from various perspectives Sharifi and Zarei (2004) argue that the internal perspective (Government-2-Government (G2G)), roughly corresponding to the administrative sphere, is particularly critical as an enabler of other perspectives (like Government-2-Citizen and Government-2-Business). First when government agencies have integrated both their data repositories and work processes one can expect dramatic effects of e-Government efforts, not just in terms of internal efficiency but also in providing truly citizen centric services (Sharifi and Zarei 2004). This suggests that the G2G aspect can be viewed as a prerequisite in terms of realizing the overall objectives of e-Government such as citizen inclusion, citizen centric services, transparency and so forth. Keeping in mind that e-Government development seems to be driven by the interests of the administrative sphere and that the majority of efforts are carried out by public administrations as the primary driver (Flak et al. 2005), it seems likely that potential causes for the relatively slow progress for e-Government remain to be found within the G2G realm.

This paper reviews the government-to-government (G2G) literature to investigate the status of current efforts and the nature of the problems reported in the G2G literature. Fifty-eight journal and conference papers are mapped according to the e-Government maturity stages of Layne and Lee (Layne and Lee 2001). It has been suggested that public administration scholars emphasize organizational aspects of e-Government whereas IS scholars tend to emphasize technological aspects (Grönlund and Horan 2005). This study investigates the distribution of these aspects in the G2G literature and points to a number of key research areas within each aspect.

ASSESSING THE STATE OF G2G

A number of e-Government maturity models exist. Some have originated from research efforts (Layne et al. 2001; Moon 2002; Siau and Long 2005), others have been proposed by institutions like Deloitte and Touche, UN and Gartner Group (Siau et al. 2005). The models range from two to five in number of maturity stages and have varying strengths, yet none of the models are comprehensive enough to combine different perspectives including technology, organization, management and politics (Siau et al. 2005). Consequently, Siau and Long synthesized existing models into a new 5 stage model (Web presence, Interaction, Transaction, Transformation and e-Democracy) (Siau et al. 2005).

The various stage models all provide interesting insights on the maturity level of e-Government. For the purpose of assessing the G2G literature, it was decided to use the model developed by Layne and Lee (2001). The Layne and Lee model (Figure 1) is well suited for assessing the G2G literature as all the stages of this model relate well to the internal aspects of e-Government (contrary to other models that includes democratic and political issues that extends the scope of G2G by going beyond the administrative sphere). Also, the model is well known and much cited in the e-Government community (Currently the most cited e-Government paper according to the Web of Science). A brief description of the four stages is given below.

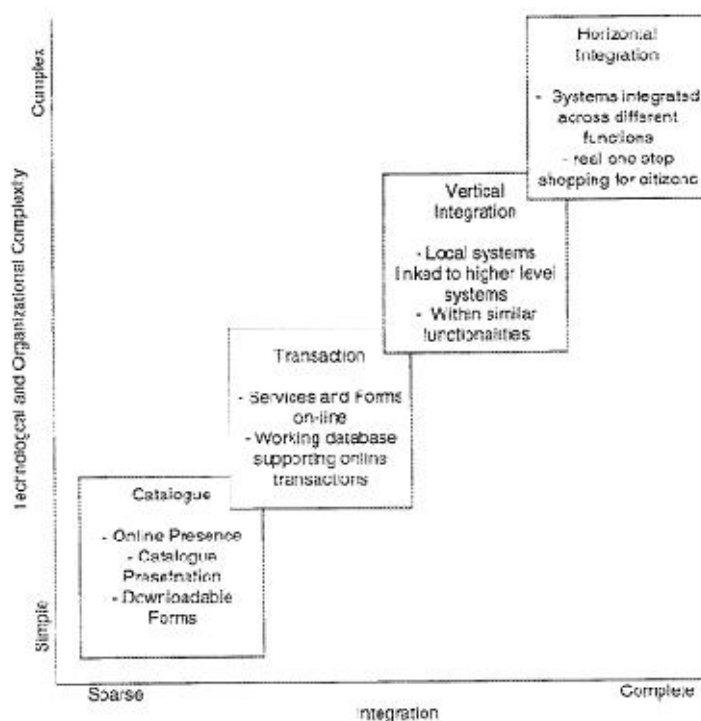


Figure 1. Dimensions and stages of e-Government development (Layne et al. 2001)

Catalogue

Initially, government agencies have little experience or competence with information technology. Projects in the Catalogue stage are characterized by having low level of risk and by being limited in scale and scope. Value is created by putting information online, thus compiling electronic catalogues of government information with hyperlinks to other resources. This stage does not include the possibility of online transactions.

Transaction

Stage two allows for interaction between government entities and its constituents. Simple transactions can be completed as governments automate and digitize services by supplying online interfaces to their existing back-office systems. Such functionality can increase the sense of efficiency for both government case handlers and stakeholders needing to complete a transaction. Additionally, the transaction stage provides the opportunity for a broader democratic process by holding interactive conversations with constituents.

Vertical integration

Focus is now moving from automation and digitization towards transformation of government services. This stage can be seen as a natural progression from the transaction stage in integrating the scattered systems (e.g. databases) at various (vertical) levels of government. Vertical integration goes beyond providing hyperlinks to government entities at different vertical positions and relies on the ability of an e-Government system to extract and/or submit information from/into all necessary systems, irrespective of vertical position, in order to complete a transaction.

Horizontal integration

Recognizing that citizens and businesses requiring assistance from governments typically need more than one single service, there is a need for improving the efforts of co-locating services and making them more easily accessible. In simple terms this means co-locating digital services (e.g. assemble closely related services in a single interface where data can be extracted across agencies automatically, when needed). More advanced this means that performing a service like applying for a drivers license after moving to another state would automatically trigger related services at other government departments (e.g. the local election department).

Whereas benchmarking and development of maturity models have been given much attention in the e-Government research community, the maturity of e-Government efforts according to the research literature has not yet been assessed.

METHOD

Literature reviews are an important part of the development of the IS field (Webster and Watson 2002). They offer the opportunity to synthesize and reflect on previous theoretical work, thus providing secure grounding for the advancement of knowledge. Webster and Watson (2002) suggest that the elements of a good literature review include a structured approach to identifying the source material and the use of a concept matrix or other analytical framework leading to 'a coherent conceptual structuring of the topic'.

Article Selection Approach

The purpose of this paper is to investigate the maturity of G2G efforts according to the research literature. Hence, it was desirable to identify a representative sample of existing research on the topic, but not to get a complete overview of all relevant publications. The Web of Science (<http://isi3.newisiknowledge.com/portal.cgi>) citation index was used to identify 58 relevant articles. The Web of Science covers 1254 leading journals in the science, social science, and humanities fields. This list contains contributions from public administration journals like Government Information Quarterly, the American Review of Public Administration, Public Administration Review, IS journals like Information Systems Journal, European Journal of Information Systems, Social Science Computer Review and the International Journal of Information Management and a number of information systems and e-Government conference proceedings. The literature search was conducted during October and November 2005. Table 1 outlines the search phrases that were applied to identify 209 potentially relevant papers.

A scan of the 209 titles and abstracts found that 123 papers discussed issues beyond G2G and these were consequently considered outside the boundaries of this study. Full text versions of the remaining 93 papers were obtained and read and another 28 papers debating meta or very general issues that would apply to several maturity levels were discarded. This left 58 papers for further analysis. The 58 papers in the final sample saw a fairly equal distribution of conference papers (59 %) and journal papers (41 %).

The 58 papers were analysed according to concepts, following Webster and Watson's (2002) suggestions for literature reviews. First, the papers were categorized according to maturity level based on the nature of the contents reported in each paper. A second round of analysis was conducted to establish if the nature of problems investigated could be considered as primarily technological or organizational/managerial. Following a grounded approach, each paper debating integration issues was coded by carefully reading the papers and assigning keywords to them. These keywords then served to outline a number of key research issues regarding both the technical and organizational aspects of G2G development.

Search phrase	Number of hits
Government to government	118
Government to government and e-Government	23
G2g and e-government	5
Integration and e-government	22
Cooperation and e-government	16
Collaboration and e-Government	7
e-government and local government	18
Total	209
Beyond G2G	123
G2G, but either too general to fit any maturity level or discussing meta issues	28
Final sample	58

Table 1. Literature search phrases

FINDINGS

The sample of the G2G literature was classified according to Layne and Lee's (2001) maturity model. The classification was performed according to which stage the problem definition in each paper could be related. In cases with no clear problem formulation, classification was based on the case description of the papers. The results provide an overview of how mature G2G efforts are, the nature of current challenges for the higher maturity levels and outlines a set of key technological and organizational challenges.

The 58 papers in the sample saw an uneven distribution across the maturity levels suggested by Layne and Lee (2001) (Figure 2). The following sections elaborate on the distribution of efforts related to each of the four maturity levels and discuss the contents of the papers that did not fall into any of the categories.

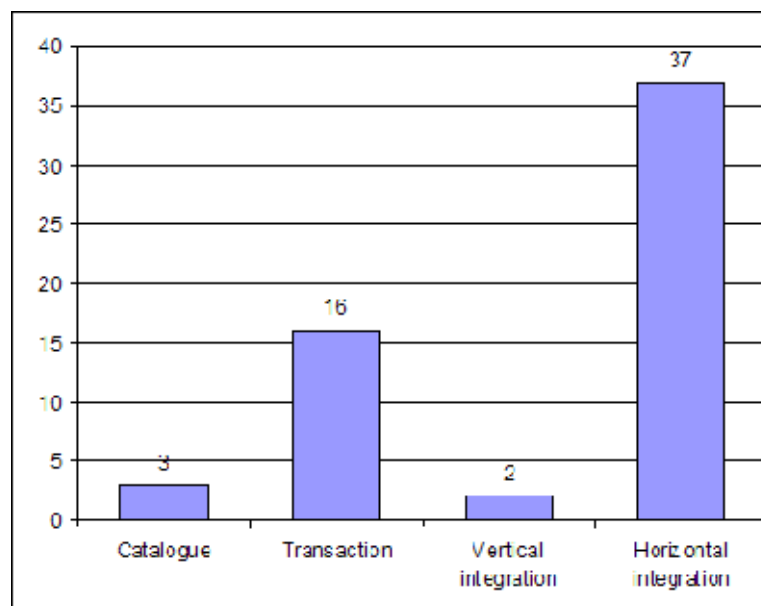


Figure 2. Distribution across maturity levels

The sample was then analyzed to identify if the nature of the challenges for each maturity level could be considered to address primarily technological issues or organizational and managerial issues adding to a coherent conceptual structuring of the G2G literature as suggested by Webster and Watson (2002). This analysis shows that the lower maturity stages has a fairly similar distribution whereas final stages are dominated by organizational/managerial issues (Figure 3).

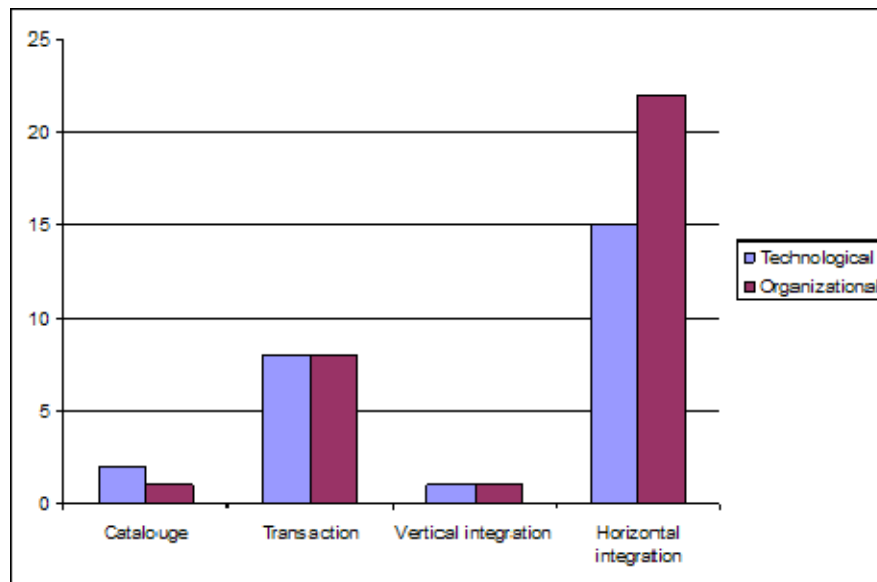


Figure 3. Nature of challenges for each maturity level

As the majority of papers in the sample debate integration issues it seemed likely that future challenges will relate to these stages rather than the Catalogue and Transaction stages. Consequently, a more in-depth analysis was performed to synthesize the nature and content of the challenges related to integration efforts (See Table 2).

Nature	Challenge	Explanatory text	Example references
Technological	IS modelling and systems development	The nature of e-Government systems calls particular attention to new classification schemes for administrative services, shared semantics, joint understandings of integrative interfaces and new IS modelling approaches.	(Gouscos Lambrou Mentzas and Georgiadis 2003; Klischewski 2003; Kunii 2003)
	Database and legacy systems integration	Agencies typically possess a variety of proprietary legacy information systems and databases. Extracting data from these for use with other or new information systems often cause problems.	(Augsten Bohlen and Gamper 2004; Baptista Leite da Silva and Paiva 2004; Makolm 2004)
	Choice of service platforms	Currently there seems to be no standard technology platform on which to develop services for in order to ensure seamless service delivery and support easy possibility for adding functionality.	(Gamper and Augsten 2003; Pappa and Makropoulos 2004)
	Size and complexity	The size and complexity of government structures along with the amount of information agencies often maintain poses challenges both related to capturing and storing information and to retrieving information.	(Koh Ryan and Prybutok 2005)
	Choice of infrastructure and architecture	Systems architectures and technology infrastructure plays an important role in enabling or inhibiting integration and interoperability. Currently, there is no defacto standard but rather a multitude of possible solutions making inter-agency and inter-administration efforts difficult.	(Bo Tong Wang Peng Tang and Yang 2004; Sepic and Kase 2002; Wagenaar and Janssen 2002)

Organizational	Lack of robust frameworks	Although there is no shortage of frameworks covering different aspects of e-Government development and implementation, few if any has synthesized existing frameworks to account for variations in e.g. culture, government structures, legislation, e-Readiness and so forth. Consequently, existing frameworks are based on a limited number of cases without much reference to other frameworks.	(Chutimaskul and Chongsuphajsiddhi 2004; Joia 2004; Sharifi et al. 2004)
	Managing the e-transformation	An important part of the development and implementation of e-Government is to redesign obsolete government operations to utilize the potential of IT. The extent of required change as well as the diversity of stakeholders involved makes it difficult to manage the transformation.	(Scholl 2004; Tan and Pan 2003)
	Managing workflows across heterogeneous units	Inter-agency cooperation often requires shared workflows between heterogeneous environments. Yet, there is a lack of knowledge on how to establish, organize and coordinate such virtual government supply chains.	(Pasic Diez and Espinosa 2002)
	Understanding e-Government as a paradigm shift	The bureaucratic model of governance is challenged by a new e-Government paradigm proposing a new set of values. The e-Government paradigm emphasizes horizontal organization, external orientation, cooperation and user orientation.	(Ho 2002; Voss Roeder and Marker 2003)
	E-Government and constitutional principles	The rapid pace of technology development and consequently e-Government development tend to leave legislation one step behind. This raises a number of issues related to e.g. privacy concerns and citizen rights. Also, e-Government development has commenced without much concern for constitutional principles.	(Jaeger 2002)

Table 2. Key G2G integration challenges

DISCUSSION

This section briefly discusses the classification of the G2G literature according to Layne and Lee's (2001) maturity model. Second, findings related to the nature of the challenges faced in G2G efforts are discussed and a few key research areas are outlined.

As predicted by Layne and Lee (2001), the higher maturity levels of e-Government show an overweight of organizational challenges rather than technological. This review has outlined five technological and five organizational challenges by synthesizing the contents of recent research on the topic.

On a meta level, it is interesting to observe the large number of frameworks and approaches appearing on various aspects of G2G development and implementation. These frameworks are often based on one or two case studies and do provide interesting insights into particular contextual settings. Future research could attempt to synthesize existing frameworks and experiences into more general and robust frameworks.

Applicability of Layne and Lee's (2001) maturity model

As might be expected since e-Government has been around for some time now, only a small portion of the papers in the sample focused on issues related to making government information available through web interfaces, corresponding to the first maturity level. Nonetheless, the almost absent emphasis on these issues appear somewhat surprising as the sample covered papers representing the early e-Government efforts and not just recent publications.

Surprisingly few papers discussed level three issues. This was particularly surprising given the sample of G2G literature. Issues on integrating the horizontal levels of government were thought to represent considerable challenges, yet only five of 58 papers emphasized such issues. One possible explanation could be that integration efforts rarely displays a distinct vertical or

horizontal orientation, but rather includes elements of both. The sample investigated in this paper contains a number of such examples and it seems that integration efforts often are conducted from a service provision perspective, requiring both horizontal and vertical integration in a single effort. Such efforts have in this analysis been categorized as level four issues, since they were equally, or more focused on level four than level three issues. This finding challenges the separation of vertical and horizontal integration into distinct sequential maturity levels. One integration stage seemingly could cover both vertical and horizontal integration since integration efforts naturally will assume a holistic perspective on integration covering both the current levels 3 and 4.

Key challenges of G2G integration efforts

Neither the technological nor the organizational challenges outlined in this paper seem sufficiently well understood and still hold a number of unresolved issues. Hence, resolving the challenges outlined in Table 2 can serve as a research agenda for the G2G segment of e-Government.

Although the identified technological challenges all have an impact on G2G development, some challenges seem more fundamental than others do. While the challenges related to *IS modelling and systems development*, *Database and legacy systems integration* and *Size and complexity* may cause considerable headache, these challenges may at worst slow down the pace of development. Challenges related to *Choice of technology infrastructure and architecture* and *Choice of service platform* can, on the other hand have major consequences as this provides the backbone for later e-Government efforts. Although a number of efforts outline the importance of settling for open solutions, the literature reports highly fragmented ICT architectures may cause problems at later stages (Wagenaar et al. 2002). The lack of standards may cause problems when different types of architecture adopted by different government agencies within nations eventually need to be integrated across the original agencies. Another problem may appear as integration across nations becomes an issue and different nations operate with different standards. Only a few papers discuss integration across nations and this is not yet a major concern. Still, as e-Government further matures this is likely to become an issue.

Neither of the organizational challenges stands out as more fundamental than the others. However, increasing our understanding of the different stakeholders and the interests at play seem likely to be necessary for addressing three of these challenges; *Managing the e-transformation*, *Managing workflows across heterogeneous units* and *Understanding e-Government as a paradigm shift*. As the need for integrating agencies grows, the complexity of such efforts increases exponentially. A government agency by itself has numerous stakeholders, often with a variety of agendas, and each additional agency involved in an integration effort adds new interests and agendas. This complexity needs to be addressed, understood and managed properly to ensure successful G2G efforts, yet the required dynamism involved has proven difficult for practitioners (Tan et al. 2003). Despite this, none of the papers in the sample answers important questions like how to identify key stakeholders or how to identify or align different stakeholder interests. Challenges related to *workflows across heterogeneous units* and *Understanding e-Government as a paradigm shift* underline the importance external orientations by government agencies. The new paradigm of e-Government suggests a shift in process organization towards networked government organizations as opposed to today's vertical hierarchy of control, a shift in internal communication from top-down hierarchical towards multidirectional networks with central coordination, increased external communication and a change in leadership style from command and control towards facilitation and coordination (Ho 2002). Such a shift challenges existing power structures as power becomes decentralized and traditional power centres are forced to become facilitators and coordinators rather than decision makers. Understanding the shifting power structures and stakes involved in G2G development will thus be necessary to minimize the challenges that inevitably emerge caused by the paradigm shift.

The different challenges had received various attention in the sample literature. Particularly issues relating to *IS development and modelling* and *Understanding e-Government as a paradigm shift* had only been suggested by a few authors. On the other hand issues relating to *Choice of infrastructure and architecture* and *Managing e-transformation* was discussed in a number of papers. This indicates that some challenges are considered seem more significant than others. The suggested shortcomings of existing IS modelling and systems development approaches related to e-Government have received little attention and probably need further investigation and justification. *Understanding e-Government as a paradigm shift* may indeed be too general as a category thus not being the primary focus of many studies but rather be an underlying assumption of many studies.

Limitations

The literature reviewed in this paper was identified from searches on the Web of Science. While the Web of Science covers a variety of conference proceedings and journals (see method section), several outlets containing e-Government references are not covered with this search strategy. This review is consequently not representative for the entire G2G area of e-

Government. However, the Web of Science is considered to cover a sufficient amount of outlets to provide a decent status and overview.

The identified G2G challenges reflect problems related to the maturity levels of Layne and Lee (2002). Given the reduction of papers from originally 219 to the final sample of 58 papers (See Table 1), it seems reasonable to assume that administrations may have additional concerns to those reported in this review. The majority of topics reported in the discarded papers reflect issues regarding interaction between administrations and external stakeholders like citizens and businesses. Although the issues reported in the discarded papers certainly are on the agenda, they yielded only limited insights into the internal transformation of administrations and were therefore deemed outside the scope of this study.

IMPLICATIONS

The findings of this study have implications on two different areas: e-Government maturity models, and important research issues related to G2G integration.

The analysis of the G2G literature indicates that the stages of Layne and Lee's e-Government maturity model may not correspond well with actual e-Government development efforts. Particularly, the separation of vertical and horizontal integration as separate stages proved hard to recognize in the literature. Contrary to Layne and Lee's model, the literature reports that vertical and horizontal integration often occur simultaneously and in response to needs arising from the objective of providing a particular service digitally. This tendency suggests that e-Government evolves in a more bottom-up, ad hoc fashion than proposed by Layne and Lee (2001).

Over the recent years, a number of benchmarking initiatives have been conducted. The majority of these conclude that e-Government sophistication is surprisingly low and that e-Government by no means live up to its rhetoric (Cap Gemini Ernst & Young 2003; Flak et al. 2005; Kaylor et al. 2001). This study indicates significant attention related to various integration efforts, both nationally and internationally. A plausible implication is thus that sophisticated e-Government services is dependent on an internal reorganization of government agencies, including a certain level of vertical and horizontal integration and that we can expect a rapid rise in e-Government service sophistication shortly when ongoing integration efforts produce results.

As this review found that the majority of research efforts on G2G relate to horizontal or vertical integration issues. Despite the many efforts on such issues, there is reason to believe that we have just scratched the surface both in terms of challenges related to achieving integration and in utilizing the possibilities for improved governance. The numerous integration initiatives identified in this study almost entirely report stand-alone efforts, i.e. integration is pursued in order to achieve a single objective like producing a particular service. Issues like enterprise architectures and interoperability standards are, with a few exceptions, absent from the reviewed literature. This indicates that future research will need to focus more explicitly on synthesizing existing experiences into developing general structures to support deployment of integration efforts.

The issues of highly fragmented infrastructures and architectures have clear implications for both national governments and trans-national policy makers and standardization bodies. Continuing development on fragmented architectures may lead to future difficulties in integrating national and trans-national systems in a seamless and efficient manner. Consequently, national governments, super-national organs (like the European Union) and organizations governing technology standards need to take active part in establishing information architectures and interoperability standards that government agencies can adopt in their G2G efforts.

As agencies increasingly focus their attention on integrating both information systems and administrative processes, a number of challenges emerge in terms of aligning different stakeholder interest, resolving issues springing from cultural differences as well as managing and coordinating distributed integration efforts. Although these issues are mentioned repeatedly in the reviewed literature, solutions to this have not been explicitly explored. There thus seem to be a need for investigating how well current theories are able to address the increasing stakeholder complexity and if new theories should be developed or imported from other disciplines to improve our ability to interpret and understand the situation. Additionally, the increasing management and coordination challenges emerging much as a consequence of integration efforts, indicate that there may be a need for investigating the usefulness of existing management frameworks and techniques in relation to the challenges facing public managers dealing with integration efforts.

CONCLUSION

According to this review, e-Government has moved beyond initial stages of development and web presence and current efforts seem largely focused around integrating government entities in order to organize governments more effectively and at the same time provide seamless access to information and services for the populace.

This study applied Layne and Lee's (2001) maturity model for assessing the G2G literature. Although this model has been criticized for neglecting the political elements of e-Government development, the model still appeared suitable for assessing the internal perspectives of e-Government (G2G). The results indicate that the separation of integration efforts into two distinct maturity levels (horizontal and vertical) may be artificial in that this corresponds poorly to ongoing e-Government integration efforts where vertical and horizontal integration seem to take place simultaneously and in response to the redesign of a particular function or service. This proposition needs further validation, but if true, it suggests that the third and fourth maturity level of Layne and Lee's (2001) model be merged into one integration level. However, developing a robust G2G maturity model was not the primary objective of this study and this is consequently left for future research.

This study further found that the number of papers in the sample focusing on organizational challenges were in majority over the those discussing technological issues related to the higher maturity levels of G2G development. The problems discussed related to the higher maturity levels were synthesized into ten key research challenges that can serve as a research agenda for the G2G segment of e-Government. Of the technological challenges, the fragmentation of information architectures and lack of interoperability standards stand out as particularly important, whereas increasing our understanding of stakeholders and stakeholder interests in G2G efforts seems to be a prerequisite for addressing several of the organizational challenges and therefore should be given high priority in future research.

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